MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

VOL. XXV. AUGUST, 1897. No. 8

INTRODUCTION.

The MONTHLY WEATHER REVIEW for August, 1897, is based on 2,864 reports from stations occupied by regular and voluntary observers, classified as follows: 144 from Weather Bureau stations; numerous special river stations; 33 from post surgeons, received through the Surgeon General, United States Army; 2,525 from voluntary observers; 96 received through the Southern Pacific Railway Company; 14 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 32 from Canadian stations; 20 from Mexican stations; 7 from Jamaica, W. I. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu; Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; and Commander J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the meteorological tables contained in the last section are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time, and, as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to generally conform to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are generally corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

During August no hurricanes reached the United States from the West Indies, but one is reported to have struck the coast of Mexico and Gulf of California on the 6th and 7th; very few severe local storms were reported. Rainfall was very generally deficient and the temperature in excess. Agricultural interests generally begin to feel the increasing dryness of the air and the failure of rainfall; these latter features have been characteristic of the southern Pacific Ocean, Australia, and India for some years past, and the same causes that have produced the great drought in that region have evidently affected North America to a less extent.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The *mean pressure* during the current month was lowest in Nevada and Arizona and low in Saskatchewan and the Gulf of St. Lawrence; it was highest from Bermuda to the south Atlantic and Gulf coasts and high off the coast of Washington.

The highest reduced pressures were: In the United States, Key West, Jupiter, Tampa, and Charleston, 30.07. In Canada, Bermuda, 30.16. The lowest were: In the United States, Yuma, 29.76; Tucson, 29.77. In Canada, Kamloops, 29.83; Prince Albert, 29.86; Father Point, 29.87.

As compared with the normal for August, the mean pressure was in excess from the Mississippi to the Rocky Mountain Plateau, but deficient over the lower Lakes and the Middle States.

The greatest excesses were: In the United States, Denver, 0.11; Helena, 0.08; Lander and Bismarck, 0.07. In Canada, Minnedosa, 0.07; Edmonton, 0.05. The largest deficits were: In the United States, Roseburg, 0.09; Portland, Oreg., 0.07; Oswego and Portland, Me., 0.05.

As compared with the preceding month of July, the pressures reduced to sea level show a fall over New England and the Maritime Provinces and throughout the Pacific Coast region, but a rise from the Gulf States northward to the northwest provinces of Churchill and Franklin.

The largest rises were: In the United States, Bismarck, 0.15; Moorhead, 0.14. In Canada, Battleford, Prince Albert, and Winnipeg, 0.14. The largest falls were: In the United States, Portland, Oreg., 0.13; Roseburg, 0.12; Fort Canby, 0.11; Tatoosh Island, 0.10. In Canada, Father Point, 0.10.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During the month the positions of eight highs and nine

lows have been sufficiently defined to be charted on Maps I and II. Each line on these maps shows the apparent path of the high or low.

It is not intended to convey the idea that there has been any actual motion of air particles along these lines. It is probable that the action is more like that seen when a wave of the ocean approaches the coast. In this case it is known that, though there is an appearance of water sweeping on toward the land, there is in reality no forward motion of water, but at each moment there is a mass of water moving up and down in a nearly vertical direction. There may be a transferrence of the cause or force producing the high or low in the atmosphere and the effect upon the air be entirely secondary without any motion of air particles. At a height of about 6,000 feet there is nearly a constant motion of air currents from a westerly direction, or, at least, toward a direction not coinciding with the apparent path of the high or low, and it must be admitted that this motion of air currents is independent of that of the high or low.

It is extremely difficult to locate the place of origin of this force which produces our highs and lows, but it must be above our highest mountains, for the changes in pressure on the apparent approach of a high or low toward a mountain are the same as those at the base of the mountain when we allow for the less density of the air at the mountain summit. It has also been shown that the change in temperature at the summit of Mount Washington occurs about eleven hours earlier than at the base as a high or low approaches it. This is an extremely significant fact and seems to show that the source of this heat, in part at least, is above the summits of our mountains.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a.m.	52	116	8, p.m.	36	77	3,836	7.5	510	21.3
II	8, a.m.	53	111	14, a.m.	32	78	2,490	6.0	415	17.3
III	11, a.m.	42	126	18, a.m.	39	81	3,234	7.0	462	19.2
IV	17, a.m.	52	106	20, p.m.	42	85	1,950	3.5	557	23.2
V	21, p.m.	51	87	24, p.m.	44	59	1,632	3.0	544	22.7
VI	21, p.m.	47	127	24, a.m.	34	101	2,034	2.5	814	33.9
VII	25, a.m.	46	127	27, a.m.	39	98	1,818	2.0	909	37.9
VIII	28, a.m.	52	116	31, p.m.	38	76	2,160	3.5	617	25.7
Total							19,144	35.0	4,828	
Mean of 8 tracks							2,393		604	25.2
Mean of 35 days									547	22.8
Low areas.										
I	[1]	51	122	5, a.m.	41	71	3,252	6.0	542	22.6
II	[2]	53	118	13, a.m.	47	63	3,383	8.5	398	16.6
III	8, a.m.	46	117	17, p.m.	51	66	3,562	9.5	575	15.6
IV	18, p.m.	48	81	20, p.m.	49	64	980	2.0	490	20.4
V	20, p.m.	41	99	24, a.m.	40	74	1,687	3.5	482	20.1
VI	21, a.m.	52	120	26, a.m.	49	65	3,040	5.0	608	25.3
VII	23, p.m.	53	115	28, a.m.	47	67	2,380	4.5	529	22.0
VIII	27, p.m.	47	105	30, p.m.	49	60	2,220	3.0	740	30.8
IX	29, p.m.	53	118	[3]	42	98	1,500	2.5	600	25.0
Total							22,004	44.5	4,764	
Mean of 9 tracks							2,445		529	22.0
Mean of 44.5 days									492	20.5

In the column showing length of track the figures are only approximate and should be considered only to the nearest 10 miles.
[1] July 30, a. m.
[2] August 4, p. m.
[3] September, 1 a. m.

A study has been made of the place of first and last appearance, as well as of the length of their apparent paths and of their apparent velocity, and these studies are embodied in the accompanying table. The following remarks are added:

HIGHS.

The general tendency of the high areas of August has been along the parallel of about 40°, from the Rocky Mountains to the Atlantic. Their origin, however, may be traced in all but one case, which began over Lake Superior, either off the Pacific Coast or to the north of Montana. Five could be traced to the Atlantic Coast; one was last noted in Texas and two disappeared or mingled with a rather permanent high near the Middle Atlantic States.

LOWS.

The lows began, as just noted for the highs, in most cases to the north of Montana or near there. One was first noted in Nebraska and another in Ontario. The apparent motion of these lows was along the Great Lakes or along the parallels of 47° or 48°, or about 500 miles north of the general trajectory of the highs. Six of these lows were last noted in the Gulf of St. Lawrence, two off the middle Atlantic coast, and one in Iowa.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperatures and the departures from the normal, as determined from records of the maximum and minimum thermometers, are given in Table I for the regular stations of the Weather Bureau, which also gives the height of the thermometers above the ground at each station. The mean temperature is given for each station in Table II, for voluntary observers.

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II. The mean temperatures given in Table III for Canadian stations are the simple means of 8 a. m. and 8 p. m. simultaneous observations.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean* temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *highest mean temperatures* at regular stations were: In the United States, Yuma, 91.9; Phœnix, 89.2; Key West, 83.8; Galveston, 82.8. In Canada, Kamloops, 70.6; Medicine Hat, 67.2. The *lowest* were: In the United States, Point Reyes Light, 55.9; Eureka and Tatoosh Island, 56.5; San Francisco, 57.6. In Canada, Banff, 53.8; Father Point, 54.4; White River, 55.1.

As compared with the normal for August, the mean temperature for the current month was deficient in most of New England and the Lake Region, but in excess in the Rocky Mountain and Pacific Coast regions.

The greatest excesses were: In the United States, Portland, Oreg., 5.1; Winnemucca, 4.1; Spokane, 3.9; Baker City, 3.7; Roseburg, 3.6. In Canada, Medicine Hat, 1.5; Edmonton, 1.4. The greatest deficits were: In the United States, Yankton and Sioux City, 3.4; Huron, 3.2; El Paso, 2.7. In Canada, Rockliffe, 3.4; Montreal, 3.0.

Considered by districts the mean temperatures of the current month show departures from the normal as given in Table I. The greatest positive departures were: West Gulf, 0.7; Middle Plateau, 2.2; Northern Plateau, 2.8; North Pacific, 2.4, The greatest negative departures were: Lower Lake, 1.1; North Dakota, 0.8; upper Mississippi, 0.9; Missouri Valley, 1.3.

In Canada, Prof. R. F. Stupart says:

The temperature has been above the average by about 2° and 4° over the greater part of British Columbia and the Northwest Territories, and just above average in Manitoba, and thence eastward to Algoma and Nipissing; over the Peninsula of Ontario it has been below by between 2° and 4°, and in the Province of Quebec by from 0° to 2°.